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INTERNATIONAL CENTER FOR AGRICULTURE RESEARCH IN THE DRY AREAS JOB #6 FINAL REPORT

RAMP-CLIN 0002-JO# 6-0002-ICARDA RAMP/ICARDA

Final Project Report

Clean seed production, multiplication and marketing for increased potato production in Afghanistan




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International Potato Center (CIP) and
International Center for Agricultural Research in the Dry Areas (ICARDA)

2006

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PROJECT DIGEST

1. Job Order No: 06-00:

Clean Seed Production, Multiplication and Marketing for Increased Potato Production in Afghanistan

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3. **Contract Line Item Number (CLIN): CLIN 2: Agricultural Technology and Market Development**

4. **Reporting period: November 2003 to April 2006**

5. **Total project budget: US$ 615,644.64**

6. **Summary of project activities and impact**

6.1 Institutional introduction

CIP (International Potato Center) is a not-for-profit international agricultural research organization with a global mandate to conduct research on potatoes and sweet potatoes, sustainable management of natural resources and urban agriculture. CIP's vision is to contribute high-quality science and capacity building to the global effort to reduce poverty, hunger and malnutrition and make sustainable development possible for poor potato and sweet potato farmers, their families and communities. CIP has its headquarters in Lima, Peru with outreach programs at other locations in Africa, Asia and Latin America. CIP is a member of the Consultative Group for International Agricultural Research (CGIAR), a network of 15 research centers mostly located in the developing world, and supported by more than 50 donor members. CIP as a member of the Future Harvest Consortium to Rebuild Agriculture in Afghanistan (FHCRAA) and is significantly contributing towards achieving the FHCRAA goals.

ICARDA (International Center for Agricultural Research in the Dry Areas) is one of 15 centers supported by the CGIAR. ICARDA's mission is to improve the welfare of poor people through research and training in the dry areas of the developing world, by increasing the production, productivity and nutritional quality of food, while pre-serving and enhancing the natural resources base. ICARD serves the entire developing world for the improvement of lentil, barley and faba bean; al dry area developing countries for the ruminant production; and the west and central Asia and North Africa (CWANA) region for the improvement of bread and durum wheat, chickpea, pasture and forage legumes, and farming systems. ICARDA's research provides global benefits of poverty alleviation through productivity improvement integrated with sustainable natural-resource management practices. ICARDA meets this challenge through

the national, regional and international agricultural research and development systems.

6.2 Back ground information and main objectives of CIP-ICARDA project in Afghanistan

Potato is staple food in many parts of Afghanistan but lack of a formal as well as informal seed system, and non availability of quality seed in sufficient quantities limits the potential for increases in yield, and area under cultivation. Development of an efficient seed production and marketing system is, therefore, extremely important to produce more food to reduce hunger and poverty, improve living standards and reduce illicit crop production. Establishing and formalizing a system for sustainable production and use of good quality seed is imperative to attain self-sufficiency in quality seed. The project aims to achieve this goal through man power development coupled with demonstrations for rapid diffusion of technology, and by inducing the adoption of improved varieties; and establishing marketing linkages. The approach is expected to increase potato production and farm income substantially. Through USAID (Rebuilding Agricultural Markets Program-RAMP) funding, CIP in collaboration with ICARDA has initiated the project with specific objectives: (1) To produce, multiply and maintain health standards of seed potato of existing, and newly introduced improved varieties; (2) train seed producers (progressive farmers), seed program professionals, staff of the Ministry of Agriculture, Animal Husbandry and Food (MAAHF), and personnel of other organizations in seed production, storage, marketing; (3) setup an *in vitro* seed production facility (tissue culture laboratory and screen house) to produce good quality seed; (4) create potato seed storage facilities and (5) to establish "an organized marketing chain" to sell locally produced formal and informal seed and ware potato in domestic and regional markets.

CIP and ICARDA are working together to develop a sustainable potato seed production and marketing system in Afghanistan to boost potato production as a viable domestic and export industry. The entire program was expected to be handed over to the MAAHF by April, 2006, after completion of the project.

6.3 Summary of milestone achievements of the project during 2003-2006

6.3.1 Seed production and multiplication at farm-level

- Technical assistance on seed production and multiplication at farm-level was provided to seed producer groups in five target provinces (Ghazni, Helmand, Kunduz, Nangarhar and Parwan). These groups collectively produced 732.0 mt and 2,342.0 metric tons of high quality clean seed potatoes of Kufri Chandarmukhi (KCM) and Desiree varieties during 2004 and 2005, respectively. The total seed production at the end of the second project year was 3,074.0 mt (Table 1).
- Farmers of Helmand and Kunduz also produced 109.0 and 210.0 mt of high quality clean potato of KCM and Desiree varieties using 5.80 ha and 12.50 ha land, respectively, which could be used as seed.
- Project established 72 demonstration plots in five target provinces to test the performance of potato varieties in different ecological zones of the country, and to disseminate the modern technologies to the end users. Under the strict supervision of the project team an amount of 225.0 mt potatoes were produced at Ghazni, Helmand, Nangarhar and Parwan provinces. This production was free from diseases and could also be used as seed for further multiplication (Table 2; Annex.-I)).
- Average potato yield increased by 40.0 % due to the introduction of improved varieties and associated technologies (Table 3).
- CIP/ICARDA introduced seed/ ware potato production in autumn season (September-December) in Nangarhar during 2004 that lead to production of two crops/ year. It enhanced the income of resource poor farmers through production of good quality seed during aphid free period. Double cropping has lead to the development of a novel seed production cycle in Afghanistan for spring and autumn seasons at high and low altitudes, respectively in Nangarhar.
- In five target provinces and in Bamyan, a total of 1125 farmers, staff of Ministry of Agriculture, Animal Husbandry and Food (MAAHF) and NGOs was trained in integrated crop management (ICM), integrated disease management (IDM), aphid monitoring and in post-harvest management and marketing of potato seed (Table 4).

Table 1
Clean seed potato production in Afghanistan during 2004-2005

Province	Variety	Year -2004		Year -2005		Total	
		Farmers involved	Seed produced (MT)	Farmers involved	Seed produced (MT)	Farmers involved	Seed produced (MT)
Ghazni	KCM/ Desiree	77	533	165	644	242	1177
Nangarhar	KCM/ Desiree	17	69	153	972	170	1041
Parwan	KCM/ Desiree	25	130	104	725	139	855
Total		**129**	**732**	**422**	**2,341**	**551**	**3,073**

Table 2
Area and production of potato through demonstration plots during 2005 in five provinces

Province	Area and production of demonstration plots during 2005 in five provinces*								
	Spring			Autumn			Total		
	No.	Area (h)	Yield (mt)	No.	Area (h)	Yield (mt)	No.	Area (h)	Yield (mt)
Ghazni	10	1.73	58.32	-	-	-	10	1.73	58.32
Helmand	10	2.00	43.38	18	2.65	nil	28	4.65	43.38
Kunduz	-	-	-	1	0.2	0.35	1	0.2	0.35
Nangarhar	6	1.20	26.56	15	3.00	51.63	21	4.20	78.198
Parwan	12	1.50	44.37	-	-	-	12	1.5	44.37
Total	**38**	**6.43**	**172.63**	**34**	**5.85**	**-**	**72**	**12.28**	**224.61**

Table 3
Comparison of the demonstration plots average yield of different crops in five provinces with the farmers' field during 2005

Crops	Demo yields	Farmers yield	Differences	Percent difference
Wheat	4.89	2.87	2.20	70.38
Rice	7.1	4.82	2.19	45.43
Potato	23.31	16.65	6.66	40.00
Onion	34.03	23.14	10.89	47.06
Tomato	33.44	22.15	11.19	50.97
Okra	12.65	8.68	3.97	45.73
Mung bean	1.69	1.09	0.60	55.40
Peanut	5.08	2.88	2.20	76.38
Cotton	3.51	2.47	1.04	42.1

Table 4
Capacities building in potato clean seed production in Afghanistan during 2004-2005

	Training	Location	Person trained		Total
			2004	2005	
A	A two days training course on Integrated Crop Management (ICM)	Ghazni	83	57	140
		Helmand	61	63	124
		Kunduz	15	50	65
		Nangarhar	88	52	140
		Parwan	130	58	188
Sub-total			**377**	**280**	**657**
B	A two days training course on Integrated Disease Management (IDM)	Ghazni		33	33
		Helmand		49	49
		Kunduz		48	48
		Nangarhar		48	48
		Parwan		50	50
Sub-total				**228**	**228**
C	Training course on potato aphids, their importance and management in seed production	Ghazni	09	-	09
		Parwan	25	-	25
Sub-total			**34**	**-**	**34**
D	A two days training course on seed potato marketing	Ghazni	17	33	50
		Helmand	-	06	06
		Nangarhar	-	51	51
		Parwan	35	52	87
Sub-total			**52**	**142**	**194**
E	A two weeks training course on tissue culture, micro-propagation and mini-tuber production techniques	Kabul	07	05	12
Sub-total			**07**	**05**	**12**
Grand Total (A+B+C+D+E)			**470**	**655**	**1125**

6.3.2 Developing and strengthening micro-propagation facilities for basic seed production

- A tissue culture laboratory and a screen house facility were established at Badam Bagh, Kabul.
- Twelve personnel of MAAHF were trained in tissue culture, micro-propagation and mini-tuber production techniques.
- Two of the technicians were trained on tissue and micro-propagation techniques in India during 2003.
- A subject-specialist was hired from The Energy and Resources Institute, New Delhi, India to train the Afghan technicians, and to initiate the micro-propagation cultures at the newly established laboratory. Micro-propagation cultures of four improved varieties (Kufri Chandramukhi, Desiree, Kufri Badshah, Kufri Phukraj) were established and multiplied.
- *In vitro* plantlets of four potato varieties were transplanted in green house for mini-tuber production
- A working tissue culture laboratory with all equipment listed in inventory (S. No. 1-136) and a screen house handed over to MAAHF on April 12, 2006 at the presence of Mr. Carlos Alonso, Dr. Sarath Ilangantileke and Dr. Muhammad Arif (CIP), Mr. Abdul Rahman Manan (ICARDA), Dr. Abdul Qahar Samin (RAMP/Chemonics) and Dr. Muhammad Aziz Usmanzai (MAAHF).

6.3.3 Potato storage and marketing

- Thirty five country stores were built in four target provinces and in Bamyan providing an economical and improved way of seed potato storage (Table 5; Annex. II). Each store is 6x 5x 4 meters in size with a capacity of 20 metric tons each. Total capacity of these stores is over 720 mt. Farmers stored 310 mt of seed potato during 2004-2005.
- Storage capacity and efficiency of total nine (7 in Ghazni and 2 in Parwan) was further improved by installing steel shelving (3 shelves each stores).
- Over 1000 small farmers and 100 extension workers from Ghazni, Helmand, Kunduz, Nangarhar and Parwan provinces were formally trained on clean

seed production and marketing to boost potato as profitable cash and food crop in Afghanistan. Additionally, 2824 farmers were trained on improved potato production technologies through 30 field days. Over 20,000 farmers, extension workers, village elders, and staff of other agencies have directly benefited from project activities. Three radio programs on potato production and marketing were produced in collaboration with the Communication Unit of ICARDA, Afghanistan. These programs through broadcasting by more than 50 local radio stations reached over an estimated 15 million listeners. In addition to this, during 2004-05, a total of 25 formal trainings were conducted that were covered by national and international electronic and print media, and expected to reach almost entire population of the country. The success stories of these trainings were published in “Week in ICARDA” and “CIP, SWCA-News Letter”. Both these news letters were published in electronic and paper versions and were circulated world-wide in scientific and public communities.

Table 5
Establishment of country stores and storage capacity

S. No.	Province	District	No. of country stores	Storage capacity (MT)
1	Ghazni	Khwaja Omari Center Qara Bagh	4 3 2	80 60 40
	Sub-total		**9**	**180**
2	Helmand	Grishk Nawa Center Germ Seir	2 1 1 1	40 20 20 20
	Sub-total		**5**	**100**
3	Nangarhar	Khogiani	7	140
	Sub-total		**7**	**140**
4	Kunduz	Khinjan	2	40
	Sub-total		**2**	**40**
5	Parwan	Sia Gard Surkh-e-Parsa	2 5	40 100
6	**Sub-total**		**7**	**140**
	Bamyan	Center	5	120
	Sub-total		**5**	**120**
Total			**35**	**720**

6.3.4 Capacity building: workshops and trainings

To develop an effective seed production system, farmers were needed to be trained in production of disease free seed. Therefore, CIP-ICARDA organized two series of trainings on Integrated Crop Management (ICM), and on Integrated Disease Management (IDM) during 2004 and 2005 in five target provinces. Trainings were conducted during 2004 on integrated crop and disease management, post harvest handling, tissue culture techniques, and potato marketing. A total of 470 farmers and staff of National Agricultural Research System (NARS), NGOs, and ICARDA were trained on ICM and IDM issues. By organizing 26 field days, over 3000 farmers were trained. Two training courses on potato aphids, their importance, monitoring and management for seed production were organized in Parwan and Ghazni provinces during 2004. Besides, scientists from CIP-SWCA and ICARDA, two experts each from Central Potato Research Institute of India, and Graintec India Limited also imparted training on aphid monitoring and marketing. Thirty three participants from MAAHF, potato site coordinators, staff of NGO and ICARDA attended the training the said course. The purpose of training was to train in seed production, and to disseminate knowledge on importance of aphids and its management for seed-potato production. Another training course on tissue culture techniques was conducted during 2004 in Badam Bagh, Kabul, and seven participants from MAAHF were trained in micro-propagation techniques.

CIP in collaboration with ICARDA organized a specialized training course on marketing seed potato for 52 participants in Ghazni and Parwan provinces during 2004. Participants included representatives from MAAHF, various NGOs, extention agents, farmers' cooperatives, Development Works Canada, progressive seed potato farmers, and traders of seed/ware potatoes. Both courses were inaugurated by the Directors of Agriculture of the respective provinces. Dr. Mohinder Singh Kadian, Agronomist, CIP; Mr. M.B.S. Sandhu, Executive Director, Graintec India Limited; and Mr Moeen ud Din of CIP-ICARDA Afghanistan presented

various mechanisms for developing intra- and inter-provincial linkages between seed and ware potato farmers.

During 2005, five trainings each in ICM and IDM were organized through two series of trainings in Ghazni, Helmand, Kunduz, Nangarhar, and Parwan provinces. Each of these trainings was a two day event where the first day was devoted to lectures where as practical training was imparted on the second day.

Resource persons deliberated on the improved agronomic practices and on diseases and insects of potatoes and their control during ICM training. Through lectures, CIP-ICARDA scientists exposed the trainees to recent developments in clean seed production of potatoes. The second day of the training was devoted to practical exercises on land preparation, planting methods, fertilizer application, irrigation, and on insect and pest management practices. Cumulatively in five provinces, 199 farmers, 41 staff of MAAHF, and 40 personnel of NGOs and other developmental agencies were trained in ICM practices. Through IDM training series, CIP-experts delivered lectures covering major fungal, bacterial, viral and nematode diseases of potato in Afghanistan; their diagnosis and integrated control measures; identification of major aphid species, their relationship with virus transmission; and monitoring and control in seed potato crop. Slides and live specimens were used to facilitate the diagnosis of pests. Through practical sessions the participants were trained in diagnosis of bacterial wilt, and two viral diseases (potato virus Y, and potato leaf-roll virus). A 'Plant-Clinic' was also organized where diseased plant specimen and insects brought by farmers and extension workers were identified by the resource persons, and control measures were recommended. Participants were also trained on various aspects of aphid monitoring. A total of 136 farmers, 57 officials of MAAHF and 35 staff of NGOs, and other agencies were trained during five IDM trainings. All the training courses in both the ICM and IDM series were concluded with an assessment of the participants' acquired knowledge on ICM and IDM that exhibited a 90% success rate. Besides high officials from MAAHF, Provincial Directors of Agriculture and Extension Services, representatives of Provincial Rehabilitation Team of United States

Department of Agriculture (PRT-USDA), and of RAMP were also present during both the training series. The events were covered by the local, national and international print and electronic media. Dr. Mohinder Singh Kadian, Agronomist, International Potato Center, South West and Central Asia (CIP-SWCA), New Delhi, Dr. Muhammad Arif, Seed Specialist/IRS and Mr. Muhammad Essa Hussaini, Local Coordinator, CIP Liaison office, Kabul; Dr. Nasrat Wassimi, and Mr. A. R. Manan, of ICARDA-Afghanistan were the resource persons for these trainings.

Marketing is the very back bone of any business activity, including Agriculture. Through improved agro practices farmers enhance the productivity and quality of their produce whereas if not properly trained in marketing skills they can not reap the benefit of increased productivity. To improve seed potato marketing system in Afghanistan, two training courses of 2 days each were conducted during 2005 in Parwan and Ghazni. The participants were seed producers (progressive farmers), traders and staff of MAAHF and NGOs.First seed potato marketing training course was held at Charikar in Parwan province. Mr. Abdur Manan, A total of 54 participants including a few from Bamyan, and Nangarhar provinces attended the same. MBS Sandhu, Chief Manager, Marketing and Agricultural Export, Punjab State Co-operative Supply & Marketing Federation Ltd., Chandigarh, India; Dr. Ghulam M. Bahram, Economist, ICARDA-Kabul; Dr. Muhammad Arif, CIP-Regional Seed Specialist and Mr. Muhammad Essa Hussaini, Local Coordinator of the project, were the resource persons. Second course on marketing was organized by the same team in Ghazni. Mr. Sultan Hussain Abasyar, Director of Agriculture, Ghazni and Mr. Chaman Militi, a representative of Directorate of Agriculture, inaugurated the course. A total of 45 participants including farmers from five target districts, staff of MAAHF and representatives of NGOs attended. Out of the total 146 participants, 73 were farmers, 12 traders and 10 officials of MAAHF and other agencies. Lecture notes from resource person particularly from Mr. MBS Sandhu and a consultant report on market development to improve seed potato marketing in Afghanistan, was submitted to RAMP.

Third Potato Seed Marketing Training course was conducted during 2005, in Jalalabad for the farmers of Nangarhar province. Dr. Ghulam M. Bahram of ICARDA-Afghanistan was the resource person. The training was coordinated by Dr. Muhammad Arif and Mr. Muhammad Essa Hussaini, Seed Specialist and Local Coordinator of project, respectively. Mr. Abdul Rehman Manan represented ICARDA, Afghanistan, and Dr. Abdul Qahar Samin participated from RAMP. A total of 51 participants representing seed producers, staff of MAAHF, and traders from Nangarhar attended the said training (25 farmers, 14 staff of MAAHF, 4 traders and 8 staff of implementing agencies).

Resource person delivered lectures covering basic and applied aspects of seed potato marketing with particular reference to Afghanistan's situation. The lectures were delivered in English and translated in Dari or delivered in Dari and Pashto to make understandable for the participants. The lectures were supported by the power point presentations to facilitate the communication and dissemination of seed potato marketing knowledge. After two to three lectures, an opportunity of group discussion was given to the participants to discuss issues related to seed potato marketing with the resource persons, and also among themselves.

A training course on Tissue Culture and Micro-Propagation Techniques was conducted at Badam Bagh, Kabul from during 2005. Mr. Om Prakash of the Energy Research Institute (TERI), New Delhi), India trained five participants from MAAHF on different aspects of potato tissue culture, micro-propagation, and in mini-tuber production. Besides imparting training, Mr. Om Prakash also initiated the work on production of mini-tubers of improved potato varieties at tissue culture laboratory and established *in vitro* cultures of four improved varieties (KCM, Desiree, K. Badshah, K. Phukraj). These were sub-cultured time to time for further multiplication. Further details of these trainings and capacity building activities are reported in Tables 6-10.

Table 6
A list of different training courses and number of trainees in five target province of Afghanistan during 2004-2005

	Training	Location	Person trained		Total
			2004	2005	
A	A two days training course on Integrated Crop Management (ICM)	Ghazni	83	57	140
		Helmand	61	63	124
		Kunduz	15	50	65
		Nangarhar	88	52	140
		Parwan	130	58	188
Sub-total			**377**	**280**	**657**
B	A two days training course on Integrated Disease Management (IDM)	Ghazni		33	33
		Helmand		49	49
		Kunduz		48	48
		Nangarhar		48	48
		Parwan		50	50
Sub-total				**228**	**228**
C	Training course on potato aphids, their importance and management in seed production	Ghazni	09	-	09
		Parwan	25	-	25
Sub-total			**34**	-	**34**
D	A two days training course on seed potato marketing	Ghazni	17	33	50
		Helmand	-	06	06
		Nangarhar	-	51	51
		Parwan	35	52	87
Sub-total			**52**	**142**	**194**
E	A two weeks training course on tissue culture, micro-propagation and mini-tuber production techniques	Kabul	07	05	12
Sub-total			**07**	**05**	**12**
Grand Total (A+B+C+D+E)			**470**	**655**	**1125**

Table 7
A list of different training courses and type and number of trainees in five target province of Afghanistan during reporting period (January to December 2005)

Course Description	Province	Type and number of trainee			
		Farmers	Staff of MAAHF	NGOs	Total
A: A two days training course on Integrated Crop Management (ICM)	Ghazni	50	03	04	57
	Helmand	42	11	10	63
	Kunduz	38	08	04	50
	Nangarhar	29	07	16	52
	Parwan	40	12	06	58
Sub-total		**199**	**41**	**40**	**280**
B: A two days training course on Integrated Disease Management (IDM)	Ghazni	25	05	03	33
	Helmand	20	17	12	49
	Kunduz	27	15	06	48
	Nangarhar	27	12	09	48
	Parwan	37	08	05	50
Sub-total		**136**	**57**	**35**	**228**
C: A two days training course on seed potato marketing*	Ghazni	29	04	-	33
	Helmand	05	01	-	06
	Kunduz	00	00	00	00
	Nangarhar	29	14	08	51
	Parwan (including Bamyan)	48	04	--	52
Sub-total		**111**	**23**	**08**	**142**
D: A two weeks training course on tissue culture, micro-propagation and mini-tuber production techniques	Kabul	--	05	--	05
Sub-total			**05**		**05**
TOTAL (A+B+C+D)		**446**	**126**	**83**	**655**

Table 8
District-wise details of different training courses (type and number of trainees) in five target provinces of Afghanistan during 2005

Course Description	Province	Districts	Type and number of trainee			Total
			Farmers	Staff of MAAHF	NGOs	
A: A two days training course on Integrated Crop Management (ICM	Ghazni	Center	20	3	4	27
		Khoja Omari	23	-	-	23
		Qarabagh	7	-	-	7
		Jaghori	-	-	-	-
		Nawar	-	-	-	-
		Sub-total	**50**	**03**	**04**	**57**
	Helmand	Center	6	9	10	25
		Garmsir	7	-	-	7
		Greshk	4	2	-	6
		Nad Ali	18	2	-	20
		Nava	5	-	-	5
		Sub-total	**42**	**11**	**10**	**63**
	Kunduz	Center	7	4	-	11
		Aliabad	5	1	4	10
		Archi	1	-	-	1
		Chardarh	17	1	-	18
		Imam sahib	2	1	-	3
		Khanabad	6	1	-	7
		Sub-total	**38**	**08**	**04**	**50**
	Nangarhar	Center	-	2	16	18
		Behsud	3	-	-	3
		Batikot	2	1	-	3
		Kama	3	3	-	4
		Khewa	3	1	-	4
		Khogiani	15	0	-	16
		Surkhrud	3	0	-	4
		Sub-total	**29**	**07**	**16**	**52**
	Parwan	Charikar	8	2	6	16
		Jabalsaraj	3	2	-	5
		Siagard	14	4	-	18
		Surkhparsa	8	2	-	10
		Bagram	7	2	-	9
		Sub-total	**40**	**12**	**06**	**58**
		Total-A	**199**	**41**	**40**	**280**
B: A two days training course on Integrated Crop Management (IDM)	Ghazni	Center	11	3	3	17
		Khoja Omari	12	0	0	12
		Qarabagh	2	0	0	2
		Jaghori	0	1	0	1
		Nawar	0	1	0	1
		Sub-total	**25**	**05**	**03**	**33**
	Helmand	Center	7	12	12	31
		Garmsir	2	1	0	3
		Greshk	2	1	0	3
		Nad Ali	5	1	0	6
		Nava	4	2	0	6
		Sub-total	**20**	**17**	**12**	**49**
	Kunduz	Center	7	11	6	24
		Aliabad	6	2	0	8
		Archi	3	1	0	4
		Chardarh	8	1	0	9
		Imam sahib	2	0	0	2

		Khanabad	1	0	0	1
		Sub-total	**27**	**15**	**06**	**48**
	Nangarhar	Center	0	6	9	15
		Behsud	2	1	0	3
		Batikot	3	1	0	4
		Kama	0	1	0	1
		Khewa	3	1	0	4
		Khogiani	16	1	0	17
		Surkhrud	3	1	0	4
		Sub-total	**27**	**12**	**09**	**48**
	Parwan	Charikar	6	3	5	14
		Jabalsaraj	4	1	0	5
		Siagard	10	1	0	11
		Surkhparsa	10	1	0	11
		Bagram	4	1	0	5
		Bamyan	3	1	0	4
		Sub-total	**37**	**08**	**05**	**50**
		Total-B	**136**	**57**	**35**	**228**
C: A two days training course on seed potato marketing	Ghazni	Center	9	4	0	12
		Khoja Omari	9	0	0	9
		Qarabagh	11	1	0	12
		Jaghori	0	0	0	0
		Nawar	0	0	0	0
	Helmand		5	0	0	6
		Sub-total	**34**	**5**	**0**	**39**
	Nangarhar	Center	0	4	8	12
		Behsud	7	2		9
		Kama	6	2		8
		Khewa	6	2		8
		Khogiani	5	2		7
		Surkhrud	5	2		7
		Sub-total	**29**	**14**	**08**	**51**
	Parwan	Charikar	12	1	0	13
		Jabalsaraj	5	0	0	5
		Siagard	8	2	0	10
		Surkhparsa	13	0	0	13
		Bagram	4	1	0	5
	Bamyan		3	1	0	4
		Sub-total	**45**	**5**	**0**	**50**
		Total-C				
D: A two weeks training course on tissue culture, micro-propagation and mini-tuber production techniques	Kabul	Kabul	--	05	--	05
		Total-D	**--**	**05**	**--**	**05**
Total (A+B+C+D)			**446**	**126**	**83**	**655**

Table 9
Related Training Activities completed (workshops, individual training, and seminars) during 2004

Dates or duration	Type (Indv/group – no.)	Trainee (Institution)*	Trainer	Location	Course name, topic
13 April	Group training, 70 trainee	Farmers, staff of Ministry of Agriculture, NGOs and ICARDA	CIP (Mohind Kadian, Mooen ud din)	Parwan	ICM training course
15 April	Group training, 37 trainee	Farmers, staff of Ministry of Agriculture, NGOs and ICARDA	CIP (Mohind Kadian, Mooen ud din)	Ghazni	ICM training course
18-21 May	Group training, 25 trainee	Farmers, staff of Ministry of Agriculture, NGOs and ICARDA	CIP (Mooen ud din)	Ghazni	Seed production & enterprise training.
15-16 June	Group training, 36 trainee	Staff of Ministry of Agriculture, NGOs and ICARDA and progressive farmers	CIP (Mohinder Kadian), CPRI (Dr. VK Chandla	Prwan	Training course on aphid monitoring, their importance & control..
17 June	Group training, 9 trainee	Staff of Ministry of Agriculture, NGOs and ICARDA and progressive farmers	CIP (Mohinder Kadian), CPRI (Dr. VK Chandla	Ghazni	Training course on aphid monitoring, their importance & control..
20 June	Group training, 60 trainee	Staff of Ministry of Agriculture, NGOs and ICARDA and farmers	CIP (Mohinder Kadian, Moeen ud Din)	Parwan	IDM Field training
21 June	Group training,46 trainee	Staff of Ministry of Agriculture, NGOs and ICARDA and farmers	CIP (Mohinder Kadian, Moeen ud Din)	Ghazni	IDM Field training
17-21 August	Group training,17 trainee	Staff of Ministry of Agriculture,, NGOs & ICARDA, potato traders and progressive farmers	CIP (Mohinder Kadian, Moeen ud Din), India (MR. BS Sandhu)	Ghazni	Potato seed marketing training
22-24 August	Group training,35 trainee	Staff of Ministry of Agriculture,, NGOs & ICARDA, potato traders and progressive farmers	CIP (Mohinder Kadian, Moeen ud Din), India (MR. BS Sandhu)	Parwan	Potato seed marketing training
19 October	Group training, 63 trainee	Framers, staff of Ministry of Agriculture,, NGOs & ICARDA,	CIP (Moeen ud Din)	Nangrah ar	ICM training course
1st November	Group training, 61 trainee	Framers, staff of Ministry of Agriculture,, NGOs & ICARDA,	CIP (Moeen ud Din)	Helmand	ICM training course
20-24 December	Group training, 7 trainee	Staff of Ministry of Agriculture	Private company (Dubai)	Kabul	Training on Tissue Culture

*If group put number of trainees only; if individual put name.

Table 10:
Related training activities completed (workshops, individual training, and seminars) during 2005

Dates or duration	Type (Indv/group – no.)	Trainee (Institution)*	Trainer	Location	Course name, topic
March 29-30, 2005	Group training, 52 trainee	Farmers, staff of Ministry of Agriculture, Animal Husbandry and Food (MAAHF), NGOs and ICARDA	1. CIP (Dr. Muhammad Arif, Seed Specialist & Mr. Mohammad Essa Hussaini, Local Coordinator 2. ICARDA (Mr. A. R. Manan, Agronomist)	Nangarhar	ICM training course
April 3-4, 2005	Group training, 57 trainee	Farmers, staff of MAAHF, NGOs and ICARDA	CIP (Dr. Muhammad Arif, Dr. Mohinder Kadian (Agronomist) & Mr. Mohammad Essa Hussaini,	Ghazni	ICM training course
April 6-7, 2005	Group training, 63 trainee	Farmers, staff of MAAHF, NGOs and ICARDA	CIP (Mr. Mohammad Essa Hussaini) ICARDA (Mr. Mohammad Ayub)	Helmand	ICM training course
April 10-11, 2005	Group training, 58 trainee	Farmers, staff of MAAHF, NGOs and ICARDA	CIP (Dr. Muhammad Arif, Dr. Mohinder Kadian & Mr. Mohammad Essa Hussaini,	Parwan	ICM training course
April 13-14, 2005	Group training, 50 trainee	Farmers, staff of MAAHF, NGOs and ICARDA	CIP (Dr. Muhammad Arif, Dr. Mohinder Kadian & Mr. Mohammad Essa Hussaini,	Kunduz	ICM training course
May 10-11, 2005	Group training, 48 trainee	Farmers, staff of MAAHF, NGOs and ICARDA	1. CIP (Dr. Muhammad Arif, & Mr. Mohammad Essa Hussaini 2. ICARDA (Dr. Nasrat Wassimi)	Nangarhar	IDM training course
May 15-16, 2005	Group training, 49 trainee	Farmers, staff of MAAHF, NGOs and ICARDA	1. CIP (Dr. Muhammad Arif, & Mr. Mohammad Essa Hussaini 2. ICARDA (Mr. A. R. Manan)	Helmand	IDM training course
May 23-25, 2005	Group training, 48 trainee	Farmers, staff of MAAHF, NGOs and ICARDA	1. CIP (Mr. Mohammad Essa Hussaini 2. ICARDA (Mr. Shah Mohammad Mohaqiq)	Kunduz	IDM training course
July 10-11, 2005	Group training, 46 trainee	Farmers, staff of MAAHF, NGOs and ICARDA	1. CIP (Dr. Muhammad Arif, & Mr. Mohammad Essa	Parwan	IDM training course

			Hussaini 2. ICARDA (Dr. Nasrat Wassimi)		
July 13-14, 2005	Group training, 33 trainee	Farmers, staff of MAAHF, NGOs and ICARDA	1. CIP (Mr. Mohammad Essa Hussaini 2. ICARDA (Mr. Mohammad Ayub)	Ghazni	IDM training course
September 28-29, 2005	Group training, 54 trainee	Farmers, traders, staff of MAAHF, NGOs and ICARDA	1. CIP (Dr. Muhammad Arif, & Mr. Mohammad Essa Hussaini 2. ICARDA (Dr. Ghulam Bahram, Agricultural Economist) 3. Expatriate (Mr. MBS Sandhu, Seed Marketing Specialist, India)	Parwan	Seed potato marketing training course
October 2-3, 2005	Group training, 45 trainee	Farmers, traders, staff of MAAHF, NGOs and ICARDA	1. CIP (Dr. Muhammad Arif, & Mr. Mohammad Essa Hussaini 2. ICARDA (Dr. Ghulam Bahram) 3. Expatriate (Mr. MBS Sandhu)	Ghazni	Seed potato marketing training course
October 5-20, 2005	Group training 05 trainee	Staff of MAAHF	Mr. Om Prakash, Tissue Culture Specialist, The Energy and Resource Institute (TERI), New Delhi, India	Badam Bagh, Kabul	Potato tissue culture, micro-propagation and mini-tuber production techniques
December 21-22, 2005	Group training 51 trainee	Farmers, traders, staff of MAAHF, NGOs and ICARDA	1. CIP (Dr. Muhammad Arif, & Mr. Mohammad Essa Hussaini 2. ICARDA (Dr. Ghulam Bahram)	Jalalabad, Nangarhar	Seed potato marketing training course

*If group put number of trainees only; if individual put name.

6.3.5 Publications

6.3.5.1 Research papers and publications in English

- Mohinder Singh Kadian, Sarath Ilangantileke, Moeen Ud Din and Nasrat Wassimi. 2004. Improving livelihood of potato farmers in Afghanistan. In Handbook and Abstracts of 4th International Crop Science Congress, held on 26th September to 1st October 2004, Queensland, Australia. P: 174.
- Mohinder Singh Kadian, Moeen Ud Din and Sarath Ilangantileke. 2004**.** Priorities for Potato Research and Development in Afghanistan. A paper presented in a workshop on "Potato Research and Development in Central Asia and the Caucasus" held in Tashkent, Uzbekistan. 27-30 April. 2004.
- Afghan farmers trained in marketing seed potatoes, The Week at ICARDA, 23, September, 2004 No. 837. P:1
- Arif, M., S. Ilangantileke, M. S. Kadian, Moeen-ud-Din, and N. Wassimi. 2005. Clean seed production, multiplication and marketing for increased potato production in Afghanistan. Technical poster presentation, in Annual Review and Planning Meeting, October 30 to November 11, 2005, Lima, Peru.
- Arif, M., S. Ilangantileke, M. S. Kadian, S. J. H. Rizvi and N. Wassimi. 2005. CIP's impact as active member of future harvest consortium for rebuilding agriculture in Afghanistan. General poster presentation, in Annual Review and Planning Meeting, October 30 to November 11, 2005, Lima, Peru.
- Arif, M. 2005. Increasing potato seed production in Afghanistan, abstracted in *CGIAR Booklet*- 2005.
- Integrated crop and disease management training in Afghanistan, The Week at ICARDA, September 2005 No. 887/888. P: 3
- Arif, M., Moeen Uddin., Kadian, M.S., Ilangantileke, S. and Wassimi, N. 2005. Clean seed production, multiplication and marketing for increased potato production in Afghanistan. CIP-SWCA Newsletter. Vol. 9: No.1. September 2005.

6.3.5.2 Publication in local languages (in preparation)

- Improved Agronomic practices for Informal Seed Potato Production in Afghanistan (Pashtu)
- Late Blight of Potato (Dari)
- Diseases and insects of potato in Afghanistan and their control (English, Pashto, Dari)
- Clean potato seed production manual (English, Pashto, Dari)
- Tissue culture techniques (Pashto, Dari)

6.4 Impact assessment of the project activities on farmers' income on value added sale and capacity building*

CIP-ICARDA has adopted an integrated approach to increase seed and ware potato production in the country. This has been done through introducing improved varieties and associated technologies; training farmers in clean seed and ware potato production and in marketing; propagating improved varieties through micro-propagation; and by constructing low cost but effective stores. This has lead to increased production of potato providing sustainable livelihood to rural communities, and has contributed towards food security at national level.

The procedure with focus on participation, ownership and capacity building is based on social and economic values in terms of community cohesion and products. This, therefore, leads to social and economic development and has to be an imperative part of the planned program. Any improved potato technology and practices adopted by the farmers has tremendous economic value in terms of increased production and more farm income. In brief the potato program impact can be noted as follows:

6.4.1 Potato yield increase

The comparison of the average yield of potato in demonstration and farmers' field indicates that the demonstration yield of 23.31 mt per hector was 40 % higher than that of farmers' field yield. Thus, adoption of improved potato varieties by farmers will increase the farm-yield by similar level. With the cultivation of the improved potato varieties in the total area under potato cultivation (422 hectares in Nangarhar, Parwan and Ghazi), the total amount of increase is expected to be 6.6x422= 2785.2 mt. Based on the current market price ($200 / mt), the total amount of income from this increment is expected to be 200x2785.2 = $ 557,040 in the three above mentioned provinces (Tables 11 and 12).

*The impact assessment study of the project activities was conducted jointly by Dr. Muhammad Arif and Ghulam M. Bahram, CIP-Seed Specialist and ICARDA-Seed Economist, respectively.

Table 11
Comparison of the demonstration plots average yield in 5 provinces with the farmers' field during 2005

Crops	Demo yields	Farmers yield	Differences	Percent difference
Wheat	4.89	2.87	2.20	70.38
Rice	7.1	4.82	2.19	45.43
Potato	23.31	16.65	6.66	40
Onion	34.03	23.14	10.89	47.06
Tomato	33.44	22.15	11.19	50.97
Okra	12.65	8.68	3.97	45.73
Mung bean	1.69	1.09	0.60	55.4
Peanut	5.08	2.88	2.20	76.38
Cotton	3.51	2.47	1.04	42.1

Table 12
Area and potatoes seed production in the five provinces

Provinces	Area and Total seed Production						Total	
	2004			2005			Area (h)	Seed Production (mt)
	Variety	Area (h)	Seed Production (mt)	Variety	Area (h)	Seed Production (mt)		
Ghazni	KCM/ Desiree		203	KCM/ Desiree	165	644.42	222	847.42
Kunduz	KCM/ Desiree		30	KCM/ Desiree	0	0	0	30
Maidan Shar	KCM/ Desiree		330	KCM/ Desiree	0	0	20	330
Nangarhar	KCM/ Desiree		69	KCM/ Desiree	153	972.33	170	1041
Parwan	KCM/ Desiree		100	KCM/ Desiree	104	724.68	124	824.68
Total	**-**		**732**	**-**	**422**	**2341.43**	**536**	**3073.1**

6.4.2 Total seed production

The seed production has rapidly increased from 732 mt in 2004 to 2341 in 2005 that indicated the significant progress achieved by the project in the five target provinces. The total amount of area that can be covered by this amount of seed during 2006 would be 7805 ha of land. If the farmers achieve a minimum yield of 16.65 mt/ ha then a total of (7805 x 16.65 = 129,953.23 mt potato seed would be available for 2007 planting (Table 11).

6.4.3 The comparison of potato income with other major crops

The comparison of the result of potato demonstration over the farmers' field in Nangarhar provinces in terms of cost benefit ratio is given in Table 13 and graph shows potato income is high over other seven principle crops in Nangarhar province. For instance, the net income of potato in the demonstration plots is $3743.68, onions $3652.64 and tomato $1808.48. The marginal income from the demonstration filed is 898.50 while of the farmers' field is 535.58. This indicates that there is a greater yield potentiality to be realized through out Afghanistan.

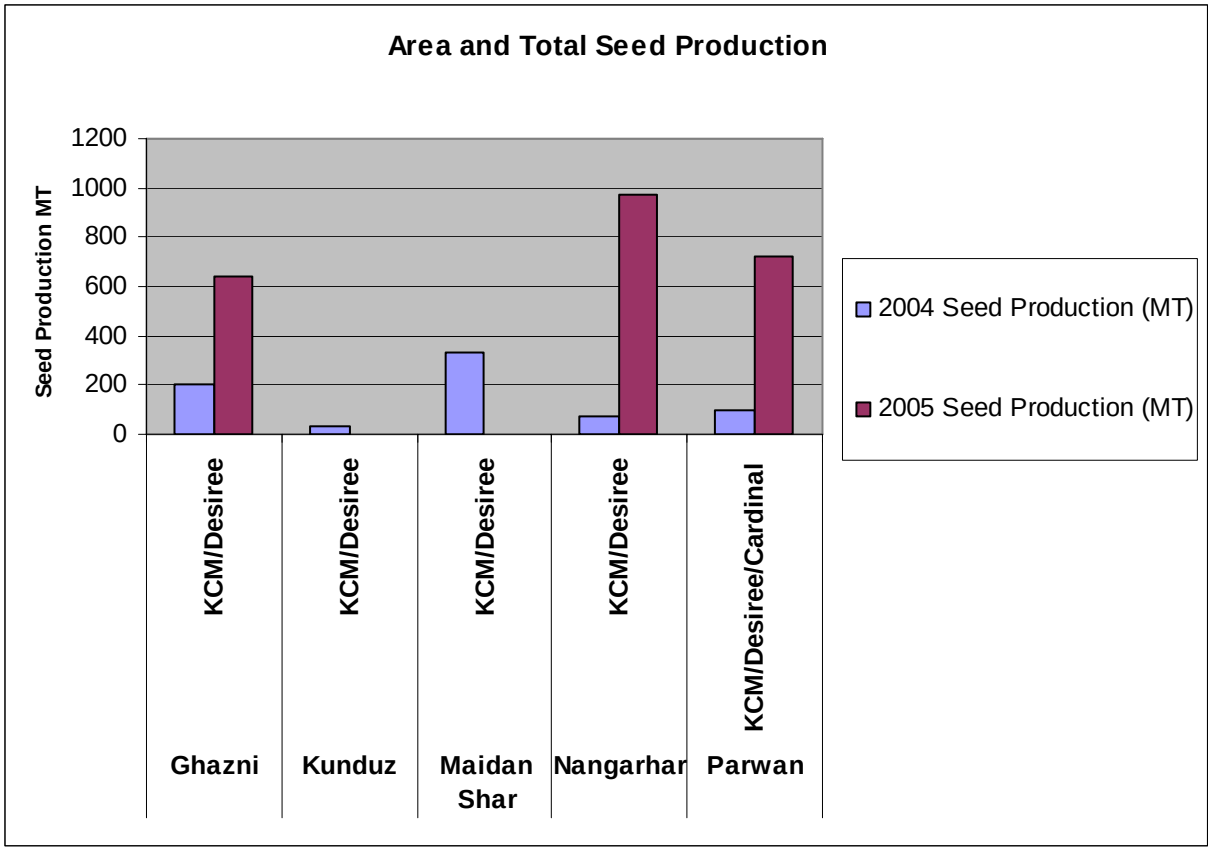

Table 13
Nangarhar average of cost benefit ratio

Crops	Demonstration					Farmers' Field				
	Total Cost	**Total Income**	**Net Income Afghanis**	**Net Income $**	**Marginal Income**	**Total Cost**	**Total Income**	**Net Income Afghanis**	**Net Income $**	**Marginal Income**
Wheat	14790.00	58630.00	43840.00	876.8	296.42	14958.00	24787.00	9829.00	196.58	65.71
Potatoes	20833.00	208017.00	187184.00	3743.68	898.50	21000.00	133467.00	112467.00	2249.34	535.56
Tomatoes	26792.00	117216.50	90424.50	1808.48	337.51	26833.00	83275.00	56442.00	1128.84	210.35
Onions	27292.00	209924.00	182632.00	3652.64	669.18	27333.00	143715.00	116382.00	2327.67	425.79
Rice	23958.00	112970.00	89012.00	1780.24	371.53	24000.00	80080.00	56080.00	1121.60	233.67
Mungbeans	12292.00	46760.00	34468.00	689.36	280.41	12458.00	30673.00	18215.00	364.30	146.21
Okra	36750.00	100100.00	63350.00	1267	172.38	30750.00	56365.00	25615.00	512.30	83.30

6.4.5 Impact of potato storage

To facilitate clean seed production, multiplication and marketing for increased potato production in Afghanistan, 33 seed storages were constructed in the six provinces. (Two more stores were constructed at Bamyan and not included in this impact assessment study). The storage cost although is not charged on the seed growers, as advantage, but also the added value to the seed being stored. As monitored the seed stored in the storages suffered very low losses (5%) while in traditional storages it used to be 40%. The storage adds both qualitative as well as price value to the seed. The seed being stored has good germination with high yield capacity. This is why the price of stored seed was Afghanis 20 and those not stored was Afghanis 10 per kg in the local markets.

A total of 680 mt seed was stored during 2005. With the maximum 5% losses the amount of seed being lost during storage was 34000 kg (680000kgx0.05= 34000kg) where as if stored with traditional methods the loss would have been 272000 kg (680000x4= 272000 kg). The total seed after being stored has become 646,000 kg (680000-34000= 646000 kg) and that without storing the seed amount was 408,000(680000-272000= 408000). The total amount of seed gained during the storage was 238000 (646000-408000= 238000). The added value of only storing was Afghanis 476,000 or $95,200 (238000x20= 476000).

Moreover, the total amount of 646 000 kg seed with Afghanis 20 per kg sold in the market was Afghanis 12,920,000 or $258,400(646000x20=12920000) only in 2005.

6.4.6 Prospects of potato seed production in Afghanistan

There are positive impacts of project both on area under potato cultivation and total potato production (Table 12). The increase in area is 292 ha (422-131=292) while total potato production also increased by more than 16 mt (2341.43-732= 1609.43 mt) over a period of one year. Based on the current trend of potato area coverage and its total production per year the demand for potato production is on the increase. Therefore, it is expected that the area may increase up to 2920 ha (292x10=2920) and total potato production up to 16094.3 mt (1609.43x10= 16094.3) over 10 years time.

6.4.7 Impact of capacity building

Impact of capacity building can be assessed by following table:

Table 14

Capacities building in potato clean seed production in Afghanistan during 2004-2005

	Training	Location	Person trained		Total
			2004	2005	
A	A two days training course on Integrated Crop Management (ICM)	Ghazni	83	57	140
		Helmand	61	63	124
		Kunduz	15	50	65
		Nangarhar	88	52	140
		Parwan	130	58	188
Sub-total			**377**	**280**	**657**
B	A two days training course on Integrated Disease Management (IDM)	Ghazni		33	33
		Helmand		49	49
		Kunduz		48	48
		Nangarhar		48	48
		Parwan		50	50
Sub-total				**228**	**228**
C	Training course on potato aphids, their importance and management in seed production	Ghazni	09	-	09
		Parwan	25	-	25
Sub-total			**34**	**-**	**34**
D	A two days training course on seed potato marketing	Ghazni	17	33	50
		Helmand	-	06	06
		Nangarhar	-	51	51
		Parwan	35	52	87
Sub-total			**52**	**142**	**194**
E	A two weeks training course on tissue culture, micro-propagation and mini-tuber production techniques	Kabul	07	05	12
Sub-total			**07**	**05**	**12**
Grand Total (A+B+C+D+E)			**470**	**655**	**1125**

6.4.8 Summary of impact assessment study of project activities

A summary of impact on farmers' income on value added sale, capacity building is given in Table 15 below:

Table 15
Summary of Impact (on farmers' income on value added sale, capacity building)

Project activity	Impact and economic growth	
	Short term (2004-05 Estimated figures in US$)	**Long term (10 years Estimated projection in US$)**
A. Seed Production and Multiplication at Farm-Level		
• Clean seed production in three provinces	Amount of income generated=US$922,029 (0.992 million)	Estimated income projection=10 million
• Ware potato production	4.8 million	48 million
• Increase in potato yield due to improved seed and technologies	40% increase in yield impact= US$557,040 (0.557 million)	6 million
• Increase in potato yield/production due to increase in area	1.6 million	16 million
Sub-total	**8.0 million**	**80 million**
B. Developing and Strengthening Micro-propagation Facilities of Basic Seed Production • Establishment of capacity building and infrastructure development in in vitro production of seed production • Sale and use of in vitro developed clean seed • Increase in yield due to adoption of disease-free seed	Impact study was not conducted	_
C. Potato Storage and Marketing		
• Improvement in seed storage to minimize losses (40%)	US$ 95,200	1 million
• Value added, improve price of seed potato after storage (30%)	US$258,400	2.5 million
Sub-total	**US$ 353,600**	**3.5 million**
Total estimated income generated (A+B+C)	**8.35 million**	**83.5 million**
D. Capacities building in clean seed production and marketing	over 1000 farmers and 100 extension workers were trained	Projected impact will be 10,000 farmers and 1000 extension workers

7. Tasks to be accomplished at the end of the program vs achieved

	Tasks	EOP Targets	Achieved
A	**Capacities building**: Training farmers, extension workers and staff of implementing agencies on clean potato seed production, multiplication and marketing in five provinces	1000 farmers and 100 extension worker (if available)	1000 farmers and 125 extension workers
B	**Seed Production & Multiplication at Farm-Level**		
	Seed production and multiplication	3000 mt @1000 mt /year	A total amount of 3,073.43 mt seed produced in 18 months of the project
	Variety evaluation and adaptability trials	60 variety trails/demos	72 were conducted in five provinces
C	**Developing and strengthening of micro-propagation facilities of basic seed production**		
	Construction of screen house	One	One constructed at Badam Bagh
	Strengthening of tissue culture laboratory facility	To establish a working laboratory	Established, strengthen and made functional
	Training of staff involved in tissue culture program	Not mentioned	12 personals of MAAHF were trained
	Supply of seed to farmers	*In vitro* basic seed to farmers	*In vitro* cultures of four selected varieties were established, mini-tuber production is in progress
D	**Potato Storage and Marketing**		
	Survey of storage construction & evaluation of potato country stores	48 country stores in five target provinces and Bamyan	35 country stores have been constructed. Due to budget cut of US$ 130,000, remaining 13 could not be constructed
	Formation of seed producers groups	As per requirement	District-wise groups formed
	Organizing field days to develop marketing linkages		30 field days
	Impact study		Two years impact study conducted and results included in this Report section 6.4
E	**Publications**		
	Technical publications for extension staff and farmers in English and local languages	Four publication were planned	Manuscripts are in press
F	**Reporting**		Monthly/annual reporting done

8. Lessons Learned and Recommendation for Future Activities

8.1 Lessons Learned from the Project to Provide a Sustainable Seed-Potato Production System in Afghanistan

Ghazni and Parwan (high-land) are proved to be best seed producing areas among RAMP targeted five provinces (Ghazni, Helmand, Kunduz, Nangarhar and Parwan). However, seed potato production experience in Nangarhar (low-land) was good but storage and marketing of such produce was difficult due to unavailability of cold storages to sustain the high temperature in summer. Due to unavailability of sufficient storage system at Jalalabad, the farmers of low-land selling their quality produce (seed potatoes) as ware consumption at low price in local market just after harvest. A limited quantity of seed could be transported to Khogiani and stored in country stores and bring back to low land for plantation. Some farmers take their produce to Peshawar for cold storage and bring it back at the time of plantation. These practices are expensive and farmers at large can not do so. Therefore, establishment of cold storage facility at Jalalabad is imperative for a sustainable seed flow to the farmers for spring and autumn plantation in Nangarhar.

At Ghazni, experience of low cost country stores is good, and seed growers are getting benefits by storing their produce at the time of harvest and selling at the time of planting. Following examples clearly demonstrates the seed production, storage and economic return of one farmer (a case study):

Province	District	No. of seed producers	Variety	Total areas	Total seed produced
Ghazni	Center	55	KCM	6.69	185.80
	Khoja Omari	68	KCM	9.38	276.18
	Qarabagh	26	KCM/Desiree	9.38	128.81
	Jaghori	7	KCM	1.19	31.84
	Nawar	9	KCM	1.33	30.78
	Sub-total	**165**		**21.92**	**644.42**

A case study of one farmer at Ghazni:

Name	CIP-ICARDA Inputs	Seed produced (mt)	Sale price at the time of harvest (Afghanis)	Stored in Country store and then sold
Amir Khan	Clean seed production technologies, seed, fertilizer, etc.	17 metric tones	Afg 10/kg Afg 170,000	Afg20/kg Afg 340,000

Due to an increase in potato seed production at Ghazni, nine stores are not sufficient and it should be increased to a minimum up to 30. The efficiency of seven was improved through steel shelving; we recommend rest to be rehabilitated.

8.2 Recommendations for future activities

1. The project has built capacities in clean seed production and established infrastructure and technical manpower in three provinces (Ghazni, Nangarhar and Parwan) for clean seed production; and in Helmand and Kunduz for ware potato production. For sustainable food security, the seed production activities must be extended to Bamyan, Maidan Wardak and as an alternative to illicit crop to southern, eastern and Northern provinces.

2. Tissue culture laboratory at Badam Bagh, Kabul started producing basic seed of selected varieties. To make the laboratory sustainable and functional for longtime, the ministry / research directorate should appoint at least four already trained personnel to continue basic potato seed production on priority.

3. A total of 33 country stores playing an important role in reduction of post-harvest losses of seed potatoes and in improving the seed marketing. However, construction of cold storages in Jalalabad, Helmand and Kunduz is strongly recommended.

4. Cultivation of white skin varieties are generally in practice but introduction and use of red skin varieties must be encouraged. More CIP materials should be evaluated and made available as standby to avoid possible susceptibility of existing varieties to diseases and pests.

5. Establishment of value added processing of potato to improve the livelihood of farmers and to reduce nutrient deficiency that is common in the rural communities, particularly in Northern and eastern provinces.

8.3 Recommendations for seed potato marketing*

1. Identify varieties for propagation with a view to market domestically/export seed/ware potatoes
2. Ascertain modes of sourcing/developing quality seed of identified varieties

- Import of germplasm
- Tissue culture
- Rapid multiplication
- Developing nucleus, breeders, foundation seed (F1, F2, F3, etc.)
- Identifying growers for multiplying foundation to certified seed (adopt contract farming in deemed appropriate by determining quality and price parameters)

3. Building infrastructure

- CIP and ICARDA have taken initiative to build stores, more donors funding is required to built more stores in other seed producing areas.
- Induce framer(s) to build such store extensively (part fund if need)
- Induce farmers to store only seed potato in such stores after proper grading.
- Introduce proper packing, stacked, and labeled storage. Charge appropriate storage fee for marketing costs.

4. Build market yards from where sale/marketing of seed/ware potatoes could be facilitated:

- Covered sheds
- Raised plinths
- Grading, bagging, weighing
- Transport facilities

*This is an extract of Seed Potato Market Development-A Consultancy Report by MBS Sandhu, Chief Manager, Marketing and Agricultural Export, Punjab State Co-operative Supply & Marketing Federation Ltd., Chandigarh, India

- Induce traders to have shops and market yards to provide grading, bagging, weighing and handling facilities
- Charge minimal fee from traders/farmers form a regulatory body /marketing board for this
- keep record of all transactions, both in physical and financial terms
- Establish linkages between productions, intermediation and buyers of potato seed
- Frame demand and supply forecasts

5. Through quality seed production, which is substantially free from pathogens, dully labeled/ branded, seed farmers can export for a better price and also chalk a demand of seed potato in the long run, to make this business sustainable.

8.4 Recommendation for program continuity and sustainability

As an impact of CIP-ICARDA project on clean seed production, more than 1000 farmers and 100 extension workers were trained who are now able to impart formal and informal diffusion of scientific knowledge among rural masses; improved high yielding varieties were tested and made available; 35 country stores were constructed; and 551 seed producers were trained who now run a profitable seed business (see case study above). All this has lead to an increase in area and production and therefore, the demand of seed potatoes is rapidly increasing all over the country (Fig: 1).

ICARDA established Village Based Enterprises (VBSEs) that are willing to diversify their activities and accommodate potato seed production and marketing as part of their operation should be encouraged by the Ministry and donors to enter in to seed potato business. The shift in donor's attitude and their willingness to finance farmer's enterprises can be utilized to establish a cooperative body of VBSEs to mobilize these capitals toward a profitable business. The MAAHF, at the capacity of federal unit, with their strong infrastructures at provinces and in districts could regulate the whole process to make it sustainable and profitable business for the farmers all over the country (Fig: 1).

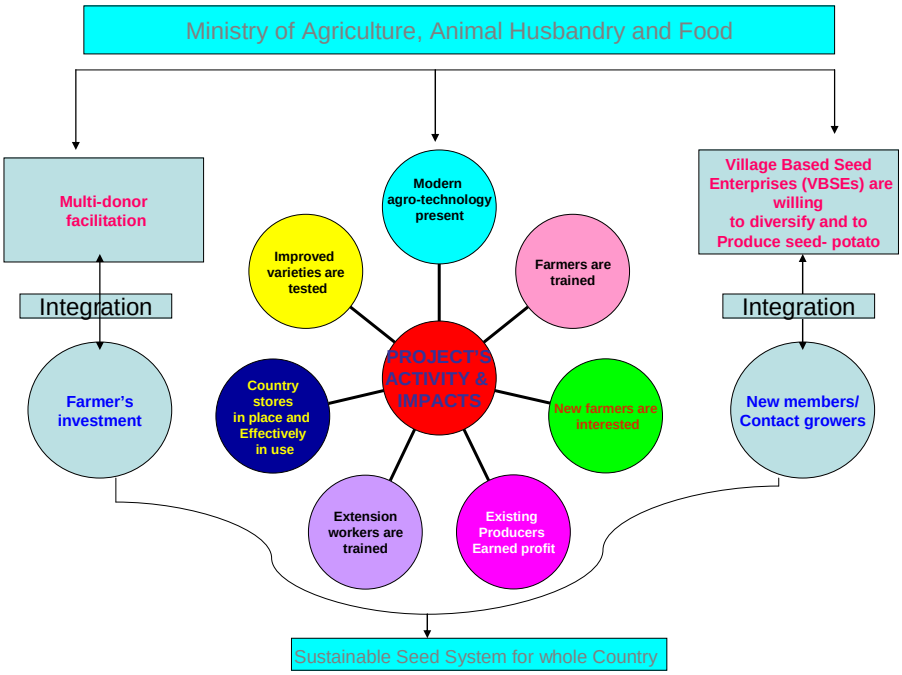

Fig 1: Flow chart indicate clean potato seed project impact and some recommendations for the sustainability of such activities in future

9. Summary of project relationship and coordination with the transitional Islamic State of Afghanistan and appropriate ministries during the course of this project

9.1 Project relationship with overall development of Afghanistan

- Seed potato production, multiplication and marketing has lead to increased potato production in Afghanistan, and will continue to play a pivotal role in development of agricultural sector as cash and staple food crop

- The project has focused on national capacity building by training farmers, Staff of MAAHF and NGOs on best practices, integrated crop and disease management, tissue culture and potato seed marketing. Over 1000 small farmers (seed producers) and 100 extension workers were formally trained in 26 training courses on clean seed production and marketing.

- The project produced over 3000 mt of good quality seed potato of high yielding varieties (KCM and Desiree). This seed will play a major role to increased potato production without depending on seed from abroad.

- The project established 72 demonstrations to disseminate technology in various provinces of the country. Due to project's activity, two potato crops/ year were introduced in Nangarhar, potato was introduced into southern Afghanistan including Helmand as an alternative to illicit crops, and potato cultivation was successfully extended to northern provinces under rain-fed conditions.

- As a sustainable alternative to cold storage and to improve marketing structure, 33 country stores with a capacity of 20 tones each were constructed that lead to successful storage of 680 mt of potatoes.

9.2 Project role in development of linkages with MAAHF, other ministries and donors

- CIP/ICARDA developed linkages with MAAHF and with donors in joint planning and execution of clean seed production and marketing activities in the country.

- Staff of MAAHF was involved in all inland and abroad trainings on clean seed production, and the senior staff of the ministry participated in formal trainings and field days in target provinces.

- Project activities were monitored by advisors of MAAHF and RAMP.

- Informal and formal presentation were made to share the project information with donors and the ministry

- One week training course on potato seed production was conducted for faculty and students, Faculty of Agriculture, Kabul University.

10. Photographs, human interest and beneficiary stories

(A separate CD containing above information is enclosed)

11. Performance indicator report

Clean seed potato production in Afghanistan during 2004-2005

Province	Variety	Year -2004		Year -2005		Total	
		Farmers involved	Seed produced (MT)	Farmers involved	Seed produced (MT)	Farmers involved	Seed produced (MT)
Ghazni	KCM/ Desiree	77	533	165	644.42	242	1177.42
Nangarhar	KCM/ Desiree	17	69	153	972.33	170	1041.33
Parwan	KCM/ Desiree	25	130	104	724.68	139	854.68
Total		**129**	**732**	**422**	**2,341.43**	**551**	**3,073.43**

District-wise details of area and production of seed potato in three provinces of Afghanistan during 2005

Province	District	No. of seed producers	Variety	Total areas	Total seed produced
Ghazni	Center	55	KCM	6.69	185.80
	Khoja Omari	68	KCM	9.38	276.18
	Qarabagh	26	KCM/Desiree	9.38	128.81
	Jaghori	7	KCM	1.19	31.84
	Nawar	9	KCM	1.33	30.78
	Sub-total	**165**		**21.92**	**644.42**
Nangarhar	Center				
	Behsud	19	KCM	8.6	146.42
	Batikot	20	KCM	11.7	209.62
	Kama	22	KCM	11.3	180.93
	Khewa	9	KCM	4.3	55.41
	Khogiani	67	KCM/Desiree	14.82	276.62
	Surkhrud	16	KCM	6.5	103.83
	Sub-total	**153**		**57.22**	**972.84**
Parwan	Charikar	2	KCM	0.4	8.05
	Jabalsaraj	2	KCM	0.4	6.09
	Siagard	53	KCM	12.8	403.57
	Surkhparsa	45	KCM	10.63	300.74
	Bagram	2	KCM	0.4	6.23
	Sub-total	**104**		**24.63**	**724.68**
Total		**422**		**103.77**	**2341.94**

Details of trainings organized in five target province of Afghanistan during January to December 2005

Course Description	Province	Type and number of trainee			
		Farmers	Staff of MAAHF	NGOs	Total
A: A two days training course on Integrated Crop Management (ICM)	Ghazni	50	03	04	57
	Helmand	42	11	10	63
	Kunduz	38	08	04	50
	Nangarhar	29	07	16	52
	Parwan	40	12	06	58
Sub-total		**199**	**41**	**40**	**280**
B: A two days training course on Integrated Disease Management (IDM)	Ghazni	25	05	03	33
	Helmand	20	17	12	49
	Kunduz	27	15	06	48
	Nangarhar	27	12	09	48
	Parwan	37	08	05	50
Sub-total		**136**	**57**	**35**	**228**
C: A two days training course on seed potato marketing*	Ghazni	29	04	-	33
	Helmand	05	01	-	06
	Kunduz	00	00	00	00
	Nangarhar	29	14	08	51
	Parwan (including Bamyan)	48	04	--	52
Sub-total		**111**	**23**	**08**	**142**
D: A two weeks training course on tissue culture, micro-propagation and mini-tuber production techniques	Kabul	--	05	--	05
Sub-total			**05**		**05**
TOTAL (A+B+C+D)		**446**	**126**	**83**	**655**

Performance Indicator Template-Country Stores (January-2006)

Potato Country Store Details

Province	District	Establishment of Storage facilities		
		End of Project Target (storage built)	Achieved during reporting period	Cumulative achieved
Ghazni	Center	3	0	3
	Khoja Omari	4	0	4
	Qarabagh	2	0	2
	Nawar		0	
Sub Total		**9**	**0**	**9**
Helmand	Center	1	0	1
	Garmsir	1	0	1
	Greshk	2	0	2
	Nad Ali	0	0	0
	Nava	1	0	1
Sub Total		**5**	**0**	**5**
Kunduz	Aliabad	0	0	0
	Archi	0	0	0
	Center*	2	0	2
	Chardarah	0	0	0
	Imam sahib	0	0	0
	Khanabad	0	0	0
Sub Total		**2**	**0**	**2**
Parwan	Charikar	0	0	0
	Jabalsaraj	0	0	0
	Siahgerd	2	0	2
	Surkhparsa	5	0	5
	Bagram	0	0	0
Sub Total		**7**	**0**	**7**
Nangarhar	Batikot	0	0	0
	Behsoud	0	0	0
	Kama	0	0	0
	Khewa	0	0	0
	Khogiani	7	0	7
	Surkhroud	0	0	0
Sub Total		**7**	**0**	**7**
Bamyan	Center	5	0	5
Sub Total		5	0	5
TOTAL		**35**	**0**	**35**

*** Constructed in Khinjan for the use of Kunduz farmers**

12. Financials

(Separate report is submitted)

Acknowledgements and credits

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The credits for photographs go to whole CIP-ICARDA team based in Afghanistan. Cover designed by S. J. H. Rizvi and A. Hameed showing various activities of the project.

ANNEXURE-I

List of Demonstration plots for the year 2005

Province-Ningarhar

S.No	Farmer Name	District	village	Varity	Area/H	GPS			
						Latitude	Longitude	Altitude	
***1**	M.Amin	//	Sea pai	KCM	.2	N.34.16.32.63	E 70.44.17.32	517 m	
***2**	Naeem	//	Shobdiani	KCM	.2	N 34.16.36..20	E 70.44.32.52	435m	
*3	Zir Gul	Kama	Masta Ali	KCM	.2	N.34.25.05.48	E.70.34.29.27	520 m	
*4	latfullah	//	Shir Gar	KCM	.2	N.34.26.47.50	E.70.36.44.70	533 m	
*5	Sayed Hussain	Behsood	Laj Gar	KCM	.2	N.34.27.12.12	E.70.26.53.18	524 m	
*6	Shafiqullah	//	//	KCM	.2	N.34.27.22.29	E.70.29.01.57	531 m	
*7	Sailani	Khewa	Lamatak	KCM	.2	N.34.32.06.33	E 70.33.50.01	576 m	
*8	Azizullzh	//	Bodialay	KCM	.2	N.34.35.55.86	E.70.36.42.85	631 m	
*9	Habibullah	Soorkhrood	Khir Abad	KCM	.2	N.34 .23.27.27	E.70.14.11.97	776 m	
*10	Sha Agha	//	//	KCM	.2	N.34.23.43.98	E.70.14.30.22	699 m	
*11	A.Basier	Khogiani	Saqawa	KCM	.2	N.34.19.43.44.	E.70.11.45.83	971 m	
*12	Naqibullah	//	//	KCM	.2	N.34.19.44.91	E.70.11.42.77	953 m	
*13	M.Hanief	//	//	KCM	.2	N.34.19.46.24	E.70.11.54.07	946 m	
*14	Hijrat	//	//	KCM	.2	N.34.20.01.00	E.70.11.56.07	988 m	
*15	Nasier Ahmad	//	//	KCM	.2	N.34.20.03.15	E.70.11.54.08	982 m	
Helmand									
*16	Mohad .Ayoub	Nad Ali	Shin kalay	KCM	.2	N.31.33.08.85	E.64.15.13.60	749 m	
*17	H.Sanam	Nawa	Ainak	KCM	.2	N.31.31.25.8	E.64.19.21.5	768 m	
*18	H.A.Wahab	Nawa	Ainak	KCM	.2	N.31.31.26.8	E.64.19.17.65	761 m	
*19	Lal Mohammad	Nawa	Ainak	KCM	.1	N.31.30.55.8	E.64.19.08.67	780 m	
*20	Hamidullah	Nawa	Ainak	KCM	.1	N.31.31.26.73	E.64.19.17.49	761 m	
*21	H.Hatime	Center	Bolan	KCM	.2	N.31.34.43.1	E.64.20.23.18	745 m	
*22	H.M.Musa	Center	Bolan	KCM	.2	N.31.34.42.54	E.64.20.23.6	740 m	
*23	Borjon	Grishk	Nahri-Sardar	KCM	.2	N.31.48.40.09	E.64.35.03.9	799 m	
*24	Tor Jon	Grishk	Nahri-sardar	KCM	.2	N.31.48.41.7	E.64.35.02.9	792 m	
*25	Qasiem	Grishk	Char Anadz	KCM	.1	N.31.48.04.32	E.64.33.34.7	818 m	
*26	Lali	Grishk	Char Anadz	KCM	.1	N.31.48.21.3	E.64.33.50.53	832 m	
*27	Mir Ahmad	Nawa	Behmeroz	KCM	.1	N.31.21.39.97	E.64.19.48.37	740 m	
*28	Modad	Garamseer	HazarJuft	KCM	.1	-	-	-	

Kunduz									
29	Safer Qul	Ali Abad	Center	KCM	.2	N-36.29.72.30	E-68.54.44.00	492 m	
30	Tazudeen	Ali Abad	Gul deen	KCM	.2	N.36.38.32.40	E.68.53.43.20	440 m	
31	M.Yousaf	Archie	Mohmand	KCM	.2	N.37.03.72.60	E.69.12.64.70	444 m	
32	Mirza Mohad	Archie	Khalily	KCM	.2	N.37.02.03.40	E.69.13.95.20	404 m	
33	H.Jurah	Char darah	Eynulmajor	KCM	.2	N.36.48.48.20	E.68.42.34.00	400 m	
34	M.Amin	Char darah	Qaria Yateem	KCM	.2	N.36.42.26.00	E.68.49.21.00	412 m	
35	Abdullah	Imam Sahib	Afghanby	KCM	.2	N.37.10.66.30	E.68.54.06.10	390 m	
36	H.Deen Mohad	Imam Sahib	EshanToop	KCM	.2	N.37.10.65.30	E.69.00.33.30	399 m	
37	Allauodeen	Khan Abad	Coghai Ulia	KCM	.2	N.36.43.10.10.	E.69.11.74.10	576 m	
38	Zarab Ali	Khan Abad	Deh Wairan	KCM	.2	N.36.39.45.20	E.69.06.54.20	816 m	
Ghazni									
39	Akhtar Mohad	Qara BAgh	Nasokhil	KCM	.2	N.33.14.04.06	E.68.04.48.98	2205 m	
40	Khadeem Hussain	Qara BAgh	Jamal	KCM	.15	N.33.14.38.50	E.68.06.24.60	2133 m	
41	M.Amin	Qara BAgh	Qaracha	KCM	.2	N.33.12.48.79	E.68.06.10.23	2177 m	
42	Jamaludeen	Qara BAgh	Khunian	KCM	.17	N.33.09.03.56	E.68.03.13.38	2113 m	
43	H.Sardar	Qara BAgh	Sheer	KCM	.2	N.33.07.18.27	E.68.59.26.62	2150 m	
44	M.Arif	Khoja-Omari	Char Burja	KCM	.2	N.33.38.36.10	E.68.24.52.58	2227 m	
45	Sayed Essa	Khoja-Omari	Noo Burja	KCM	.13	N.33.39.04.01	E.68.24.43.64	2226 m	
46	Azizullzh	Khoja-omari	Bini Sang	KCM	.16	N.33.40.15.15	E.68.24.18.37	2348 m	
47	Sayed ahad	KhojaOmari	Ali Abad	KCM	.12	N.33.40.10.29	E.68.24.25.68	2256 m	
48	M.Anwar	KhojaOmari	Char Gunbad	KCM	.2	N.33.44.15.70	E.68.22.58.29	2326 m	
Parwan									
49	Bismillah	Sia Gard	Farah gard	KCM	.1	N.34.59.58.45	E.68.49.27.61	1808 m	
50	Salih Mohad	Sia Gard	Rangab	KCM	.1	N.35.00.16.13	E.68.48.24.39	1881 m	
51	Imam Gul	Sia Gard	Qeem Chaq	KCM	.1	N.35.01.27.91	E.68.48.56.73	1965 m	
52	Hazar Amir	Sia Gard	Dara-Tang	KCM	.2	N.35.03.53.84	E.68.49.30.67	2185 m	
53	A.Saboor	Sia Gard	Qem Chaq	KCM	.2	N.34.05.42.13	E.68.42.32.24.	2038 m	
54	Nizamudeen	Sia Gard	Jui-Dukhtar	KCM	.2	N.35.00.08.15	E.68.47.36.08	1881 m	
55	Habiburahman	Sia Gard	Jui-Dukhtar	KCM	.1	N.35.00.17.28	E.68.46.22.14	1887 m	
56	A.Rauof	Sia Gard	Char Deh	KCM	.1	N.34.59.34.63	E.68.45.05.73	1923 m	
57	Shireen Agha	Sia Gard	Boda	KCM	.1	N.34.59.02.97	E.68.42.32.73	1942 m	
58	M.Amir	Sia Gard	Saqa	KCM	.1	N.34.59.37.68	E.68.44.03.29	1933 m	
59	Mirza Murad	Sia Gard	Quli-Luch	KCM	.1	N.34.59.43.60	E.68.44.56.66	1946 m	
60	A.Hakiem	Sia Gard	Boda	KCM	.1	N.35.00.04.12	E.68.41.16.82	2062 m	

*Planted in fall season 2005.

ANNEXUTRE-II

List of potato country stores built in six provinces of Afghanistan during 2004-2006*

No	Farmer	Village	District	Latitude: N	Longitude: E	Altitude
Nangarhar						
1	Suhbat Khan	Wazier/Usman Khil	Khogiani	33-38-22.67	68-24-50.37	2226 m
2	Naeem	Wazir/Karamkhil	Khogiani	33-42-05.27	68-23-48.47	2327 m
3	Sultan Mohad	Wazir/Karamkhil	Khogiani	34-11-16.64	70-09-38.05	1360 m
4*	Habib Jon	Wazier/Dosaraka	Khogaini	34-12-28.10	70o-10-21.22	1350 m
5*	Kastiray	Wazier/Morgay	Khogaini	34-10-32.64	70o-10-11.81	1440 m
6*	Wazir Kharoti	Wazier/Spin Ragh	Khogaini	34-10-40.09	70o-10-43.54	1428 m
7*	Gandeeray	Wazier/Morgay	Khogaini	34-10-42.26	70o-10-22.64	1407 m
Parwan						
8	A.Manan	Center	Sia Gard	34-59-52.55	68-51-16.4	1849 m
9	Dil Agha	KhanGul	Sia Gard	34-59-37.28	68-45-1.61	1936 m
10	M.Naeem	Lolinj	Surkhi-e-Parsa	34-53-49.71	68-39-13.8	2082 m
11	A.Qudous	Dara-i-Surkh	Surkhi-e-Parsa	34-47-0.51	68-39-39.86	2360 m
12	Zia	Bangi-Dari-Turkman	Surkhi-e-Parsa	34-47-55-66	68-36-0.2	2309 m
13*	Attaualla	Qutander	Soorkh- e-Parsa	34-43-34.32	68-44-18.83	2602 m
14*	A.Ahad	Qali-Qabize	Soorkh- e-Parsa	34-48-34.07	68-39-34.28	2216 m
Ghazni						
15	M.Arif	Char Burja	Khwaja Omari	33-38-22.67	68-24-50.37	2226 m
16	M.Hussain	Deh Darat	Khwaja Omari	33-42-05.27	68-23-48.47	2327 m
17	M.Zabtoo	Deh Khudaida	Center	:33-30-41.82	68-26-56.79	2142 m
18	M.Daud	Khushk	Center	33-35-53.47	68-24-50.43	2200 m
19	Jon.Mohad	Nasokhil	Qara Bagh	33-11-29.01	68-06-02.90	2067 m
20*	Amrudeen	Khonyan	Qara Bagh	33-09-13.58	68-02-37.55	2144 m
21*	Azizullah	Beni Sang	Khoja Omari	33-40-27.12	68-24-21.91	2257 m
22*	Abdul Basir	Qalai-Akram	Center	33-34-12.09	68-24-59.81	2190 m
23*	Shafiq	Akasie	Khoja Omari	33-41-51.84	68-23-15.50	2301 m
Kunduz						
24	Delbar	Takhta sang	Khinjan	36-01-77.0	68-56-12.5	1727 m
25	A.Haseeb	Dari-Walian	Khinjan	35-30-064	68-53-139	1775 m
Helmand						
26*	Ghulam hassan	Ab-bazan	Grishk	31-47-29.33	64-33-54.45	812 m
27*	M.Qasiem	Malgeer-charkh	Grishk	31-48-25,75	64-33-27.28	806 m
28*	H.Sanum	Einak	Nawa	31-31-43.90	64-19-29.54	749 m
29*	Agha Gul	Bolan	Center	31-34-45.17	64-20-19.58	767 m
30*	Agha Gul	Hazar Jufti-Olia	Garm Sier	31-07-36.68	64-12-10.67	720 m
Bamyan						
31*	Muslim	Hayderabad	Center	34-47.43.86	67-50-11.24	2610 m
32*	H.A.Aziem	Mir Hashiem	Center	34-49-07.23	67-48-52.50	2488 m
33*	H.Ali Raza	Bam Sarai	Center	34-45-45-56.42	67-45-59.26	2750 m
34**	Awaz Ali	Hyderabad	Center	34-47-44.14	67-50-14.18	2610m
35**	M. Aman	Sayed Abad	Center	34-48-54.57	67-50-14.18	2547m

*Country stores built or under construction during 2005, ** built in 2006.